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EXAMINER

HAILEY, PATRICIA L

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/568,690	Applicant(s) BARKHORDARIAN ET AL.	
	Examiner PATRICIA L. HAILEY	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is **non-final**.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 11-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 8, 11-21 and 24-27 is/are rejected.
- 7) ☒ Claim(s) 6, 22 and 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/21/09</u> . | 6) <input type="checkbox"/> Other: _____ |

Applicants' remarks and amendments, filed on December 7, 2009, have been carefully considered. Claims 9 and 10 have been canceled; no new claims have been added.

Claims 1-8 and 11-27 remain pending in this application.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Applicants' Priority Document was filed on February 17, 2006.

Withdrawn Objections and Rejections

The objection to claim 9 stated in the previous Office Action has been withdrawn in view of Applicants' cancellation of this claim.

The 112(2) rejection of claims 13 and 24-27 stated in the previous Office Action has been withdrawn in view of Applicants' amendment to claim 13.

The 102(b) rejection of claims 1, 4, 5, 8, 11, and 12 as being anticipated by Japanese Publication No. 10-092422, stated in the previous Office Action, has been withdrawn in view of Applicants' amendment to claim 1.

The 102(b) rejection of claims 1, 4, 5, and 7-11 as being anticipated by Ogura et al. (U. S. Patent No. 6,171,727), stated in the previous Office Action, has been withdrawn in view of Applicants' amendment to claim 1.

The 103(a) rejection of claims 1, 12-21, and 24-27 as being unpatentable over Klassen et al. (U. S. Patent No. 6,752,881) in view of Minoura et al. (Japanese Publication No. 10-092422) stated in the previous Office Action has been withdrawn in view of Applicants' amendment to claim 1.

New Grounds of Rejection

The following New Grounds of Rejection are being made in view of Applicants' amendment to claim 1, and in view of the Examiner's reconsideration of the cited references of record.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. Claims 1, 4, 5, 8, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minoura et al. (Japanese Publication No. 10-092422).

Regarding claims 1, 4, and 5, Minoura et al. teach a hydrogen storage alloy electrode ("hydrogen-storing material", "metal for the absorption and desorption of hydrogen"), containing calcium carbonate ("metal carbonate", "carbonate of an elemental metal", "Ca") in its active material layer. See the Abstract of Minoura et al., as well as paragraph [0007], which depicts the addition of calcium carbonate to a hydrogen storing metal alloy powder such as "MmNi_{3.5}Co_{0.7}aluminum_{0.3}Mn_{0.5}" ("metal..." .

Regarding claim 8, the limitation therein "...is formed in situ..." renders this claim a product-by-process claim. It has been held that:

"Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the examiner has found a substantially similar product as in the applied prior art the burden of proof is shifted to the applicant to establish that their product is patentably distinct, not the examiner to show that the same is a process of making." In re Brown, 173 U.S.P.Q. 685 and In re Fessmann, 180 U.S.P.Q. 324.

Regarding claim 11, Minoura et al. teach that the calcium carbonate is present "...as 0.1 to 3.0 % of the weight to a hydrogen storing metal alloy." See paragraph [0006] of Minoura et al. The skilled artisan would reasonably expect that the mole percent of the calcium carbonate in Minoura et al. would fall within the respectively claimed range.

Regarding claim 12, Minoura et al. teach that the hydrogen storing metal alloy powder components are subjected to "machinery grinding", see paragraph [0007].

Although Minoura et al. do not disclose the calcium carbonate as a "catalyzing agent", it would have been obvious to the skilled artisan that, motivated by the teachings of Minoura et al., the calcium carbonate disclosed by this reference would suitably function as a "catalyzing agent", given that Minoura et al. teach calcium carbonate, which reads upon Applicants' "metal carbonate".

Additionally, Minoura et al. do not explicitly disclose that the hydrogen storage alloy powder or the calcium carbonate "exhibits a nanocrystalline structure", as

instantly claimed. However, the skilled artisan would have been motivated to reasonably expect the alloy powder and calcium carbonate of Minoura et al. to exhibit such a structure, absent the showing of convincing evidence to the contrary.

4. *Claims 1-5 and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al. (U. S. Patent No. 6,171,727).*

Regarding claim 1, Ogura et al. teach a hydrogen storing alloy with its surface covered by a layer containing at least carbonate (see Abstract), or with a compound containing at least carbonic acid. See col. 3, lines 38-42 of Ogura et al.

Regarding claims 2-5, Ogura et al. teach that alkali and alkaline earth metals can be "used in the form of carbonate"; exemplary metals include lithium, sodium, potassium, magnesium, calcium, and barium. See col. 4, lines 46-49 of Ogura et al. The skilled artisan would have found it obvious to employ these carbonates in either mixtures of metal carbonates or of mixed metal carbonates ("mixed carbonates of metals"), as any combination of these alkali and alkaline earth metal carbonates would be within the purview of Ogura et al.

Regarding claim 7, Ogura et al. teach that the carbonic acid-containing compound on the surface of the hydrogen storing alloy can be expressed by the formula $M^1(CO_3)_x \cdot M^2(OH)_y$, where each of M^1 and M^2 represents one or more than one component elements of the hydrogen storing alloy, e.g., Zr, Ti, Ni, Mn, V, Cr, Fe, Co, and Al. See col. 5, lines 5-22 of Ogura et al.

Regarding claim 8, the limitation therein "...is formed in situ..." renders this claim a product-by-process claim. It has been held that:

"Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the examiner has found a substantially similar product as in the applied prior art the burden of proof is shifted to the applicant to establish that their product is patentably distinct, not the examiner to show that the same is a process of making." In re Brown, 173 U.S.P.Q. 685 and In re Fessmann, 180 U.S.P.Q. 324.

Regarding claims 1 and 11, Ogura et al. teach that the weight ratio of the carbonate relative to the hydrogen storing alloy is between 0.05 and 3 wt. %, and that the granular carbonate exhibits a particle size of between 0.1 and 5 μm (100-5000 nm; "nanocrystalline structure"). See co. 4, lines 49-53 of Ogura et al.

Although Ogura et al. do not disclose the metal carbonates as a "catalyzing agent", it would have been obvious to the skilled artisan that, motivated by the teachings of Ogura et al., the metal carbonates disclosed by this reference would suitably function as a "catalyzing agent", given that Minoura et al. teach calcium carbonate, which reads upon Applicants' "metal carbonate".

5. Claims 1, 12-21, and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klassen et al. (U. S. Patent No. 6,752,881) in view of Minoura et al. (Japanese Publication No. 10-092422).

Regarding **claim 12**, Klassen et al. teach a method for producing a metalliferous hydrogen storage material, wherein the metalliferous material and/or a catalyst (both of which can have a nanocrystalline structure, see col. 2, lines 50-56 of Klassen et al.) are subjected to a mechanical grinding procedure. See col. 2, lines 57-63 of Klassen et al.

Regarding **claims 13-17 and 24-27**, Klassen et al. teach that the grinding procedure may be selected, depending on the metalliferous material and/or the catalyst, to be differently long so as to achieve the optimal desired reaction surface and an optimal distribution of the catalyst on the metalliferous material. Further, the metalliferous material may be first subjected to the grinding, followed by adding the catalyst subsequently to the grinding process, or that this process may be reversed (i.e., the catalyst is subjected to grinding followed by the metalliferous material. See col. 2, line 64 to col. 3, line 10 of Klassen et al.

Regarding **claims 18 and 19**, Klassen et al. teach that the duration of the milling process is preferably in the area of 1 to 200 hours, see col. 3, lines 17-23 of Klassen et al.

Regarding **claims 20 and 21**, Klassen et al. teach that the milling process is carried out in an inert atmosphere, wherein the inert gas is preferably argon, see col. 3, lines 11-16 of Klassen et al.

Klassen et al., while teaching that both the metalliferous material and/or the catalyst have a nanocrystalline structure (see col. 2, lines 50-56 of Klassen et al.),

further teach metal oxides as the catalyst (col. 2, lines 40-49), but does not teach or suggest the catalyst being a metal carbonate, as recited in claim 1.

Minoura et al. teach a hydrogen storage alloy electrode (“hydrogen-storing material”), containing calcium carbonate (“metal carbonate”, “carbonate of an elemental metal”, “Ca”) in its active material layer. See the Abstract of Minoura et al.

Additionally, Minoura et al. teach that the hydrogen storing metal alloy powder components are subjected to “machinery grinding”, see paragraph [0007].

It would have been obvious to one skilled in the art at the time Applicants’ invention was made to modify the teachings of Klassen et al. by employing calcium carbonate as a catalyzing agent in a hydrogen storage material, as suggested by Minoura et al., motivated by these references’ teachings regarding hydrogen storage materials. Further, because calcium is disclosed by Klassen et al. as an exemplary metal for Patentees’ metal oxide (col. 2, line 41), the skilled artisan would reasonably expect that calcium, in the form of a carbonate, would suitably perform as a catalyst in a hydrogen storage alloy material, motivated by the teachings of Minoura et al.

Response to Arguments

In response to Applicants’ argument that Minoura et al. teach that the “calcium carbonate is added to the active material as a layer in order to suppress the generation of an oxygen gas on a hydrogen storage alloy electrode,” the Examiner

respectfully submits that Applicants' claims in their present form do not explicitly claim that the "metalliferous, hydrogen-storing material" is not in the form of a layer.

Further, the Examiner respectfully submits that the calcium carbonate disclosed in Minoura et al. is not a "protective layer on an electrode"; rather, the calcium carbonate is added to the metal alloy powder to form the active material layer. See paragraph [0007] of Minoura et al.

In response to Applicants' argument that the calcium carbonate or the hydrogen storage alloy powder of Minoura et al. do not have "a nanocrystalline structure", the Examiner respectfully submits that, absent the showing of convincing evidence to the contrary, the calcium carbonate or the hydrogen storage alloy powder of Minoura et al. could exhibit such a structure. Although Applicants claim a "nanocrystalline structure", Applicants' Disclosure does not describe how such a structure is obtained, nor is there a defined particle size range encompassing the phrase "nanocrystalline structure".

In response to Applicants' arguments traversing the Ogura et al. reference, the Examiner respectfully submits that, as with Minoura et al., Applicants' claims in their present form do not explicitly claim that the "metalliferous, hydrogen-storing material" is not in the form of a layer. The teachings of Ogura et al. are considered to structurally read upon Applicants' claims. Additionally, Ogura et al. at col. 4, lines 36-41 and col. 5, lines 23-26 teach that the carbonate of the alkali or alkaline earth metal may be added to the active material of the electrode.

Further, because Ogura et al. teach metal carbonates reading upon that respectively claimed, the skilled artisan would reasonably expect the metal carbonates of Ogura et al. to be akin to Applicants' claimed "catalyzing agent".

Further, although Ogura et al. teach the particle size of the metal carbonate as between 0.1 and 5 micrometers (100-5000 nanometers), the lower endpoint of this range is the same as the upper endpoint disclosed in Applicants' Exhibit A, submitted to define "nanocrystalline structure". Therefore, the carbonate particle size of Ogura et al. is considered to read upon Applicants' claims. Moreover, Applicants' claims in their present form do not provide a particle size range defining a "nanocrystalline structure" for either the claimed "metal" or "metal carbonate".

In response to Applicants' arguments with respect to Klassen et al. in view of Minoura et al., the Examiner respectfully submits that, contrary to Applicants' argument that Minoura et al. "is not concerned in any way with the catalyst of the absorption and desorption kinetics, but the metal carbonates are used as a protective layer on the surface of the metalliferous hydrogen-storing material", Minoura et al. at paragraph [0005] teach that the presence of calcium carbonate in the active material layer controls the generation of oxygen gas, which controls oxidation of a hydrogen storing metal alloy "and a fall of the hydrogen absorption characteristic of a hydrogen storing metal alloy can be controlled." Thus, the skilled artisan would have been motivated, by the teachings of Minoura et al., to modify the teachings of Klassen et al., to prevent the hydrogen absorption characteristic of the hydrogen storing metal alloy from falling (i.e., decreasing).

For these reasons, Applicants' arguments have been considered, but are not persuasive.

Allowable Subject Matter

6. Claims 6, 22, and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

This Office Action is Non-Final, in view of the Examiner's inadvertent omission of claims 2, 3, and 6 in the previous Office Action. The Examiner apologizes for the oversight.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PATRICIA L. HAILEY whose telephone number is (571)272-1369. The examiner can normally be reached on Mondays-Fridays, from 7:00 a.m. to 3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin C. Mayes, can be reached on (571) 272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group 1700 Receptionist, whose telephone number is (571) 272-1700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PATRICIA L. HAILEY/
Primary Examiner, Art Unit 1793
February 9, 2010